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Factsheet

Feeding Methods for Large Round Bales

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Introduction

Large round bale (LRB) haying has improved the summertime "quality of life" on the farm, especially where large acreages of dry hay must be harvested. The reduced labor demand, speed of harvest, and lowered cost are the common reasons for the shift to LRB systems. However, the inability to feed LRB with ease has been a deterrent to many farmers accepting it—especially those feeding livestock in confinement. This paper reviews the alternative methods—both old and new—which are used to feed LRB in various situations.

The use of balage (or big bale haylage) in recent years has also been slowed somewhat by limitations in how it can be fed. Some of the methods discussed here can also be applied to feeding balage.

Feed System Objectives

In choosing a method to feed LRB, the first concern is often to minimize the *time and labor* spent delivering the hay to the livestock. This is critical because it is a task that is routinely performed, day after day.

Also of major importance, and receiving more attention recently, is the aspect of *feeding losses*. Recall the effort spent attempting to harvest a good quality hay crop against uncontrollable factors. This should provide adequate incentive to minimize waste in the feeding system, in addition to the "hidden" cost of the lost hay.

Finally, *safety* concerns regarding the lifting and moving of these large hay packages must also be considered a top priority.

Table 1 Rating System for Feeding Methods (1-poor, 5-good)

Option	Labor	Feeding Losses	System Costs	Comments
Self-Feeding				
single bale	4	3-4	5	feeder must be durable, and dimensions are critical
multi-bale	5	3-4	5	must be prepared deal with build-up of refused feed
Unrolling				
manual	2	5	5	difficult with balage
mechanical	3	5	3	requires wide feed alley
Processing				
manual	1	5	5	usually short-term solution
mechanical	3	5	2	may increase animal intake; can use "total mixed ration"

Alternatives

The methods used for feeding LRB will fall into one of the general areas which are rated in Table 1. The merits and limitations of these methods are explained more fully in the following discussion.

1. Self-Feeding For any large, heavy hay package, self-feeders make good sense in that movement of the mass is minimized. That is, the livestock access the hay by their action rather than by human manouevring of the bale. Thus, where conditions are suitable, self-feeding will be the most popular means of feeding LRB because it is the simplest method, although these feeders must be **sturdy** if they are to survive a feedlot environment. With some creative thinking, many livestock producers will be able to adapt at least one of the following systems of self-feeding:

Single Bale Feeders

As shown in Figures 1, 2, and 3, single bale feeding of LRB can be accomplished with *slant-bar*, *tombstone*, and *hammock style* designs. It is crucial that the distance between the restraining bars on all these feeders be well matched to the head size of the animals which will be using the feeder since feed wastage can be minimized by restricting head movement.

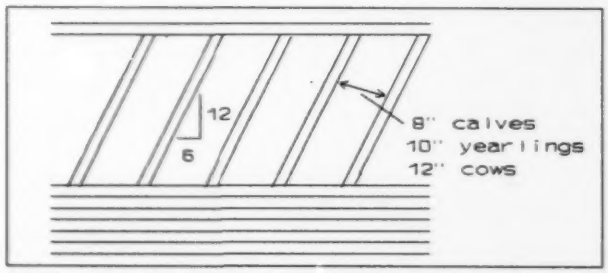

Figure 1. Slant-Bar Freeder Dimensions

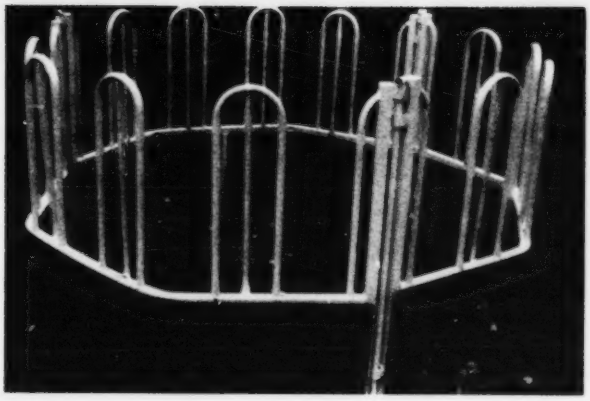

Figure 2. A Tombstone Feeder

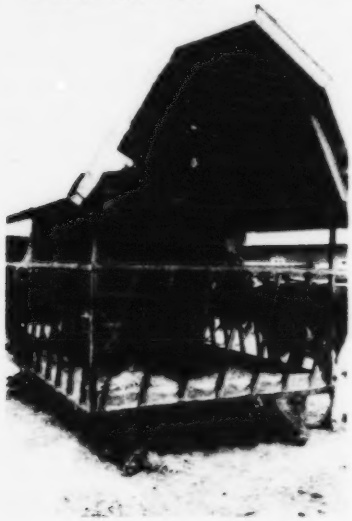

Figure 3. A Hammock Style Feeder

The other factor which is important to the success of these feeders is matching their size to the size of the bales being fed. Here, the objective is to have the diameter of the feeder sufficiently larger than the bale so that the animals are able to have their heads entirely within the feeder while eating. If this is accomplished, then any hay that is dropped from their mouths will fall within the feeder rather than at their feet where it will be trampled and wasted. Invariably, feeding losses with big bale haylage are minimal because bale size tends to be small, thus fitting the feeder better. The bottom 18" of any feeder should also have a solid panel in place to keep loose hay within the feeder.

So, while these feeders are attractive because of their simplicity, they also have potential for unacceptably high feed losses. Research suggests that if poorly designed, dry matter loss from self-feeders can exceed 40%, simply by wasting feed.

It is worth noting that the tombstone design has been associated infrequently with the death of an animal—one which has gone down, and been unable to get back up.

Multi-bale Feeders

The capability of feeding moderate to large quantities of bales, without having to start a loader tractor daily, is what sets multi-bale feeders apart from individual feeders. At least three distinct approaches are available:

(a) a *feed gate* on wheels or skids (Figure 4) requires a "pusher" bar on the feed side, such that the livestock can push the gate to within only 16 or 18 inches of the face of the bales. Again, this forces animals to have their heads fully inside the gate before reaching the hay.

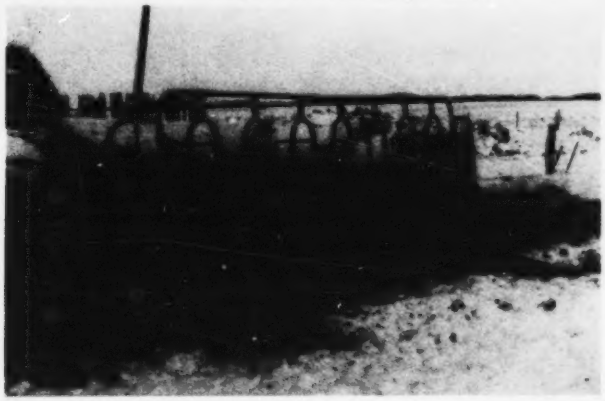

Figure 4. Feedgate on Wheels

(b) a *permanent feed fence* along a paved strip is located indoors or out, allowing placement of several bales from one side (Figure 5) using a front-end loader. If the feed area is well located, the tractor does not even have to enter the lot area to place the bales. A simple roof could be used to protect the hay and/or cattle at the feeder. The paved strip allows the feed area to be easily maintained, although manure build-up during cold weather may still be a problem.

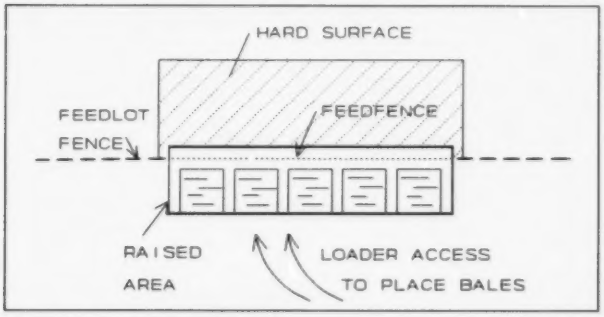

Figure 5. Permanent Feedfence

c) many farmers have designed and built efficient *multi-bale feeders* similar to that shown in Figure 6 in which bales are set in from the end of the feeder. The "pusher" bar concept can again be incorporated as shown. Although construction of a sturdy feeder on skids is more difficult than a fixed feeder of pole construction, the skid-type feeder minimizes the maintenance required to keep manure and mud from taking over a particular site.

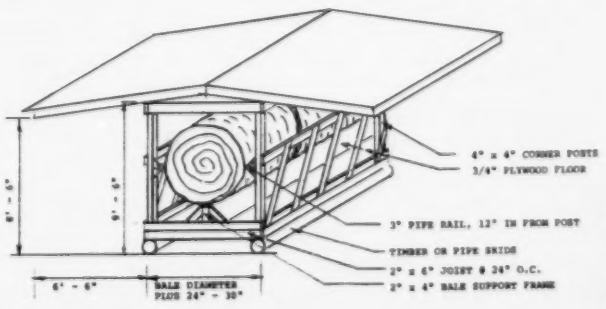
4" x 4" CORNER POSTS
3/4" PLYWOOD FLOOR
3" PIPE RAIL, 12" IN FROM POST
TIMBER OR PIPE SKIDS
2" x 6" JOIST @ 24" O.C.
2" x 4" BALE SUPPORT FRAME
6' - 6"
BALE DIAMETER PLUS 24" - 30"

Figure 6. A movable Multi-Bale Feeder

For in-barn feeding, a similar multi-bale concept can be applied to allow several bales to be loaded from the end of a feeder or center feed alley. However, with this and the other methods mentioned above, **one must be prepared to deal with the refused feed which still remains in the feeder when it is time to feed again.**

2. Unroll Bales LRB are unrolled and fed to livestock in two distinctly different situations—in confinement facilities, and in feedlot conditions. The latter involves trailered, 3-point-hitch, or front-end loader attachments which can unroll a bale simply by pulling it along the ground, or can actually rotate the bale when in the raised position in order to drop hay into a fenceline feeder (Figure 7). It is worth noting that hay unrolled on the ground can suffer feeding losses of up to 50%.

Figure 7. Loader Attachment unrolling a Bale

The other circumstance where bales are often unrolled is in barns, where livestock are tied or have access to a long bunk feeder. Unfortunately, many barns have alleys which are too narrow to accommodate LRB, or have alleys which are not accessible. In some cases, renovations can be made to allow LRB to be fed in one of the following ways:

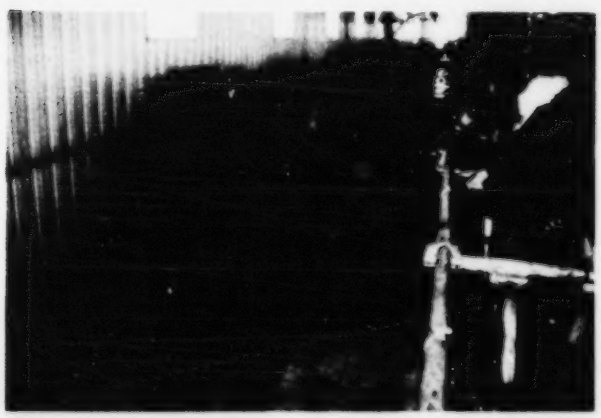

Figure 8. Unrolling a Bale by Hand

(a) Unroll By Hand

If bales are small (600 lbs. or less) and have been stored under cover and on end in order to maintain their *round shape*, then it is possible to simply unroll the bale by pushing it down the feed alley (Figure 8). This is an extremely fast method of feeding hay, and is so attractive that it is often the determining factor in baler size selection. At least one baler manufacturer facilitates a practical bale size for manual unrolling by having a "knife" option which will split a 5' long bale into two 2.5' sections just before the bale is discharged.

(b) Flat Feed Cart

This is an option in which the bale of hay or haylage is set on its end on a flat feed cart (Figure 9). As it is pulled among the feed alley the hay is peeled off by hand, much the same way in which one might uncoil wire from a heavy spool of wire tipped on end. This system requires an area at the end of the barn where a front-end loader has room to set bales on the cart. The individual doing the feeding must also be strong enough to manouevre the loaded cart.

Figure 9. A Flat Feed Cart

(c) Powered Bale Feeder

To handle heavy bales of hay and haylage, a motorized feed cart (Figure 10) can be used if alley width is sufficient. This effectively removes the "brute strength" requirement of the above two options, leaving the feeding chores accessible to almost any adult.

Figure 10. A Motorized Bale Feeder

3. Processing

In many situations, some method of processing LRB is required to permit their use in a feeding system. Significant expenditures will be feasible only where large numbers of livestock are to be fed.

(a) Manual Processing

A utility area adjacent to the feed area is often used as a place to cut up LRB with either a bale knife or an electric chainsaw. The hay can then be moved by feed cart or wheelbarrow to the animals. Sometimes the loft area of the two story barn serves as the location for bales to be cut up.

(b) Tub Grinder

A tub grinder is simply a rotating tub atop an over-sized hammermill which has been designed to handle fibrous, bulky material. When used for LRB of hay or straw the power requirements are very high (exceeding 100 hp), and the size of the resultant product can vary from powder to 6" stems, normally accompanied by substantial dust. Grinding hay permits feeding via certain types of automatic bunk feeders and/or preparation of a total mixed ration. Investment in a tub grinder is justified only when 500 tonnes of hay must be processed annually.

(c) Big Bale Chopper

This machine (Figure 11) is smaller than a tub grinder and has been designed especially to process LRB using knives to shred the rotating bale. It has relatively low power requirements (typically 50 hp), and may have the ability to dispense straw bedding into a row of freestalls or within a loafing barn.

Figure 11. Big Bale Processor

2. Self-feeders will continue to be the simplest, least labor intensive method of feeding LRB. Wherever possible, take advantage of this method in your feeding plans.

3. A simple, small, roofed area on the end or side of a barn in which cattle are to be fed will work well for assembling a batch of bales to be fed out manually over a 2- or 3-day period (Figure 12). This may save starting a tractor every day and if necessary, may provide a handy area for cutting up bales.

4. New or renovated confinement facilities where livestock are tied should plan for feed alleys with a minimum width of 7'.

5. Slotted-floor barns require good feeder design if LRB are to be fed, in order to minimize feed losses which could adversely affect the liquid manure system.

6. Experience will soon tell how "tight" bales should be baled to be successfully self-fed—especially to young animals. Many farmers have found that calves and heifers have difficulty consuming very dense bales. If bales are to be stored inside, there should be less concern about having a hard outer layer for long-term weather protection.

Figure 12. A simple "Batch" Shed

Putting together a Workable System

A farm operator seldom has the opportunity to "start from scratch" when putting a feeding system together. He usually is forced to work within the confines of existing structures, many of which do not lend themselves to the optimum set-up. However, the following points are worth considering in any new, enlarged, or remodelled livestock enterprise in which LRB are to play a vital role:

1. Pole buildings provide cheap, efficient hay storage and allow easy stacking and retrieving of LRB if wall height is adequate—this normally being 16 to 18'. If the storage can be located adjacent to the feeding site, then feeding time will be lessened. However, for loafing yards be certain that the hay storage location will not adversely affect snow and wind patterns.

7. Self-feeding of large round bales will always work better for large animals, simply because they are able to reach further—thus permitting the use of the hay-saving concepts mentioned earlier for self-feeders. Ideally, feeder size, bale size, and the width of feeder openings should be scaled-down to suite smaller livestock if they are being fed separately.

8. Remember that feeding losses are directly affected by storage methods. Even in optimum feeding conditions, hay stored outside will exhibit greater feeding losses than hay which has been protected.

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